IMPROVING JUMPS/MMS RESPONSE TIME FOR THE U. S. MARINE CORPS

Paul S. Edwards

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

IMPROVING JUMPS/MMS RESPONSE TIME
FOR THE U.S. MARINE CORPS

by

Paul S. Edwards

September 1981

Thesis Advisor: N. R. Lyons

Approved for public release: distribution unlimited

T200711

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): Improving JUMPS/MMS Response Time for the U.S. Marine Corps.	5. TYPE OF REPORT & PERIOD COVERED: Master's Thesis, September 1981 / 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Paul S. Edwards	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Naval Postgraduate School, Monterey, California 93940	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: Naval Postgraduate School, Monterey, California 93940	12. REPORT DATE: September 1981 / 13. NUMBER OF PAGES: 59
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED / 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release: distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

JUMPS	On-Line Systems
JUMPS/MMS	Real-Time Systems
OLRT	Pay Systems

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The JUMPS/MMS system was implemented by the Marine Corps in 1973. The performance of JUMPS/MMS is considered unsatisfactory because the time delays in entering information into the system result in computed amounts that do not reflect the individial Marine's current entitlements. Since the Marine Corps considers payment of all entitlements to date as important to morale, the use of the current JUMPS/MMS system necessitates the parallel operation of

the old manual system. This thesis explores the use of On-Line Real-Time systems to solve the problem of time delays and allow the phasing out of the manual system. The study particularly investigates internal controls in manual and On-Line Real-Time systems. The study concludes that an OLRT system would serve to reduce time delays, and that ADPE-FMF equipment could serve as the vehicle for implementing an OLRT system.

Approved for public release, distribution unlimited

Improving JUMPS/MMS Response Time for the U. S. Marine Corps

by

Paul S. Edwards
Captain, United States Marine Corps
B.S.I.M., Purdue University, 1974

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
September 1981

Thesis
F 283
c.1

ABSTRACT

The JUMPS/MMS system was implemented by the Marine Corps in 1973. The performance of JUMPS/MMS is considered unsatisfactory because the time delays in entering information into the system result in computed amounts that do not reflect the individual Marine's current entitlements. Since the Marine Corps considers payment of all entitlements to date as important to morale, the use of the current JUMPS/MMS system necessitates the parallel operation of the old manual system. This thesis explores the use of On-Line Real-Time systems to solve the problem of time delays and allow the phasing out of the manual system. The study particularly investigates internal controls in manual and On-Line Real-Time systems. The study concludes that an OLRT system would serve to reduce time delays, and that ADPE-FMF equipment could serve as the vehicle for implementing an OLRT system.

TABLE OF CONTENTS

I. INTRODUCTION ---------- 10

A. IN THE BEGINNING ---------- 10

B. THE NEW SYSTEM ---------- 11

1. Policies ---------- 12

2. Principles ---------- 14

C. PROGRESS ---------- 16

II. THE CURRENT SYSTEM ---------- 17

A. JUMPS/MMS FILES ---------- 17

B. INPUT ---------- 18

1. MMS Information ---------- 18

2. JUMPS Information ---------- 19

C. OUTPUT ---------- 20

1. Decentralized Payments ---------- 20

2. Centralized Payments ---------- 21

3. Provision for Payment ---------- 21

a. Direct Deposit ---------- 21

b. Check Mailed from Central Processing 22

c. Check and Cash Payments ---------- 22

4. Leave and Earnings Statements ---------- 22

III. THE PROBLEM ---------- 23

A. ERRORS IN PAY ---------- 23

B. TIME DELAYS ----------23

1. The CNA Study ----------23

2. The GAO Report----------25

3. Additional Delays ----------26

C. CURRENT IMPROVEMENTS ----------26

1. ADPE-FMF Features ----------26

2. ADPE-FMF and JUMPS/MMS ----------27

a. Similar to OPSCAN ----------27

b. The Big Difference ----------27

D. SOLUTION ----------28

E. ON-LINE, REAL-TIME SYSTEMS (OLRT) ----------28

IV. INTERNAL CONTROL IN MANUAL PAYROLL SYSTEMS ------29

A. BUDGETING CONTROL OF LABOR COST ----------29

B. REPORTS TO GOVERNMENT AGENCIES ----------29

C. SEGREGATION OF DUTIES ----------30

1. Employment Function ----------30

2. Timekeeping Function ----------30

D. PAYROLL RECORDS AND PAYROLL PREPARATION -----31

1. Preparation and Accounting are Closely Controlled ----------31

a. Payment by Check or Pay Envelope ----31

b. Statement of Earnings ----------31

c. Payroll Distribution Schedule -------32

2. Distribution of Cash or Paychecks -------32

a. Paymaster ----------32

b. Payroll Account ---------- 33
c. Limit on the Value of a Check ------- 33
d. Checks not Claimed ---------- 33
e. Adequate Receipt from Employee ------ 33
f. Standard Normal Payroll ---------- 34
g. Verification of Endorsements -------- 34
E. INTERNAL REVIEW ---------- 34
V. INTERNAL CONTROL IN AN OLRT PAY SYSTEM ---------- 35
A. ACCESS ---------- 35
1. File Access ---------- 35
2. System Access ---------- 36
3. Access to the Terminal ---------- 36
4. Logs ---------- 37
B. DATA TRANSMISSION ---------- 37
1. Concentrating ---------- 37
2. Multiplexing ---------- 38
3. Rerouting ---------- 38
4. Packet Switching ---------- 38
5. Encoding and Decription ---------- 38
C. CONTROLS ON INPUT ---------- 39
1. Comparison Checks ---------- 39
2. Echo Checks ---------- 39
3. Absurdity Checks ---------- 39
4. Limit Checks ---------- 39
D. DATA CONTROLS ---------- 40
1. Record of Transactions ---------- 40

2. Grandfather-Father-Son ---------- 40
3. Vetting Tests ---------- 41
4. Exception Listings ---------- 41
5. Concurrent Updating ---------- 41
E. INTERNAL TEST FACILITY ---------- 41
VI. CONCLUSIONS AND RECOMMENDATIONS ---------- 43
A. CONCLUSIONS ---------- 43
B. RECOMMENDATIONS ---------- 44
1. The Role of ADPE-FMF ---------- 44
a. Networking ---------- 44
b. Documentation ---------- 45
c. Computer-Generated Documentation ---- 45
d. Single Source Input ---------- 46
e. Computation Capability ---------- 46
f. Special Payments ---------- 47
g. Posts and Stations ---------- 48
2. The Role of the SDPI ---------- 49
a. Continue Present Functions ---------- 49
b. Transmisssion Security ---------- 49
c. Terminal Security ---------- 49
3. Role of the CDPA ---------- 50
a. Financial Responsibility ---------- 50
b. System Programming and Design ------- 51
c. Centralized Computation ---------- 52
d. Grandfather-Father-Son ---------- 52
e. MCDOSET ---------- 52

C. ADVANTAGES ---------- 53

D. DISADVANTAGES ---------- 53

E. SUMMARY ---------- 54

BIBLIOGRAPHY ---------- 55

INITIAL DISTRIBUTION LIST ---------- 58

I. INTRODUCTION

A. IN THE BEGINNING

Prior to the implementaion of the Joint Uniform Military Pay System (JUMPS) on July 1, 1973, the Marine Corps pay system was based on an individual pay card. This system was initiated in 1948, replacing a voucher system. One copy of the pay card was kept at the local disbursing office, and the individual Marine was paid from the copy. A second copy was kept at the Marine Corps Finance Center, Kansas City, MO. The second copy was used to process allotments, and as a backup in case the locally held record was lost or destroyed. Both cards were closed out at the end of June and December and new cards were opened, an inefficient and time-consuming process.

There were two strengths to the system. The individual Marine carried his pay record with him when transferred, and could be paid upon presenting his pay record to any disbursing officer. If the card were lost or destroyed, a new temporary record could be immediately opened and the individual Marine could be paid the basic amount for his grade, pending the arrival of a copy of the record held at the Finance Center. However, the system was of little or no value in monitoring personnel costs.

B. THE NEW SYSTEM

Development of the Joint Uniform Military Pay System (JUMPS) was initiated by Department of Defense directives in November 1966.[1] These documents initiated a Department of Defense-wide modernization of military pay systems based on:

> The application of the best and most efficient management and operating techniques in a military pay system based on (1) adequate service to members, (2) maximum practicable uniformity between the military departments, (3) centralized and computerized pay account maintenance, and (4) optimum support of the planning, programming, and timely accounting reports and other end products. Related goals are (1) to eliminate or reduce erroneous or illegal payments and (2) to produce, from the pay data bank, data and reports now available only through special statistical and reporting methods outside the pay system.[2]

and

> Initial operation of the Joint Uniform Military Pay System was the first major step of a long-range, evolving program for continuous improvement of the military pay system. This program is oriented toward continuous increases in efficiency and effectiveness, better interface with personnel and other related systems, greater precision in counting and reporting, and more effective support to military personnel appropriation and resource management system.[3]

---

[1] DODDir 7330.3 and DODInst 7330.4

[2] DODDir 7330.3

[3] Ibid

1. Policies

In order to accomplish the objectives of the system, policies were set forth to define the system's procedures:

1. Each military service will select and operate from its own site a centralized finance center. Each active duty member will be assigned a master military pay account which will be included in a centralized master pay account file for that service. Each service will be required to obtain approval for its system from the Assistant Secretary of Defense (Comptroller).

2. Electronic data processing equipment and techniques will be required for the maintenance of the master military pay accounts. The capability of the equipment selected is required to support present strength levels and to include the capacity to expand operations so as to allow for maximum planned mobilization strengths.

3. Electronic data processing equipment that will be utilized for the military pay system and other tasks is to be scheduled so as to provide continuity in the military pay function. Contingencies to avoid compromising of effective pay functions are required.

4. In addition to the centralized finance center for each service, the present disbursing capability at the base and installation level will be retained. Therefore, payments could be made at the local level.

5. Input into the system will include information that affects that member's military pay. This information will enter the system at the base or installation level by machine-sensible media which will be as close to the source as practicable.

6. Electronic communications methods will be required to transmit appropriate data between the finance center and the base or installation. Although the primary means

of communication is by electronic means, the system is also required to have a capability of being operated by mail.

7. In order to maintain uniformity throughout the Department of Defense and to facilitate cross disbursing among various services, the data elements and related features are to be standardized for all services.

8. Payments to members of other services will be accomplished by utilizing identical forms and procedures. Therefore, reporting of payments to the parent service may be accomplished in a routine manner.

9. In the event of destruction of the centralized site, alternate methods of payment are required. Therefore, the new system must have this capability before implementation.

10. Each service is required to develop forecast costs for the new system and to compare this figure with the cost of operating and maintaining the current service system.

11. The reason for implementing the system is to significantly improve the current accounting, budgeting and statistical data recording, collection, analysis, and use in the Department. Therefore, the system is not to be developed solely as a system for the payment of personnel from a centralized site by electronic data processing techniques. As the new system provides data that was previously produced by traditional methods and reports, it will facilitate the discontinuance of the manual methods.

12. The objective of the new system is to reduce the detailed work at the base or installation level. The centralized system will provide for maximum production and feedback of data for all levels. This will reduce or prevent the proliferation of special accounting or statistical reports which are required for other management

needs, because this information would be a product of the new pay system.[4]

2. Principles

Additionally, the following principles were established to guide the military services in implementing JUMPS:

1. Individual members of the military services will be paid on regularly scheduled paydays for two pay periods each month. The pay periods will end as of the 15th and last day of each month.

2. Balances due and unpaid because of member election, special location, or duty circumstances, will be carried forward on a net basis (after deduction/collections) in the accounts.

3. Time between cut-off of input processing for a pay period and date of payment to individual members must be long enough for accurate preparations of the payroll, including application of suitable control procedures and the correction and adjustment of errors. Payday will normally be concurrent with the end of the pay period, except for exigencies under local commanders' cognizance.

4. Payroll payments will be made by check unless there are obvious benefits in cash payments.

5. Leave accounting and payroll accounting are integrated in the payroll system; both are to be properly interfaced with personnel and other related input systems.

6. Individual leave and earnings statements are to be issued each month.

7. Indebtedness to the U.S. resulting from erroneous payments, tax liability and similar

---

[4]Ibid

items may be collected from members by pay deductions.

8. Members' status having an immediate or potential effect on pay computations will be kept current in individual master military pay accounts. Status data will be a principal factor in computing entitlements and deductions by computer programming.

9. All military services will use the same forms and procedures to pay members of other military services and to report such payments to the parent service.

10. A major system development goal is to reduce manual and clerical effort in operational military units and organizations, by the performance of detailed processing, computations, and record production at the centralized pay operation. To the maximum extent, centralized processing will be based on input of raw data reflecting member status changes from the level originating such changes.

11. Data required to compute pay and report actual obilgations to the Military Personnel Appropriation (MPA) manager will be derived from the master military pay accounts. In addition, actual obligations data will be adjusted to add standard expense not included in military pay computations (see DODI 7220.15, June 1, 1966, "Budgeting and Accounting for the Cost of Military Personnel Service.") Reports of such adjusted actual military pay cost will be summarized in the various arrays and aggregations required at each management level and provided to management.

12. Source Data Automation techniques will be developed and applied to the maximum practicable extent.

13. COBOL will be used as the primary programming language for problem-oriented programs, and wherever possible and practical

for interface with communication programs, supervisory programs and utility software routines.[5]

C. PROGRESS

The JUMPS/MMS system was implemented by the Marine Corps on 1 July 1973. In its implementation documents, the Marine Corps established its own goals for JUMPS:

1. Timely payment of proper amounts in compliance with applicable laws and regulations, including the proper disposition of all authorized deductions from gross pay.

2. Centralized pay account maintenance with payments generated from, and accounted for, at the central site.

3. Optimum support of the planning, programming, and budgeting systems by producing comprehensive, accurate, and timely appropriation data reports.

4. Centralized leave accounting for each Marine in accordance with applicable laws and regulations.[6]

This thesis will examine the performance of Marine Corps JUMPS in meeting its own goals, internal controls in payroll systems, and improvements that can be made in the JUMPS/MMS system using On-Line Real-Time systems.

---

[5]DODInst 7330.0

[6]MCO p7220.37

II. THE CURRENT SYSTEM

A. JUMPS/MMS FILES

The Marine Corps system for implementing JUMPS is a combination of two automated systems:

1. a personnel system called Manpower Management System (MMS), and
2. a payroll system called JUMPS.

Unique to all the services, Marine Corps created JUMPS/MMS utilizing a single data base for both systems. MMS refers to the data file for each individual as a Central Master Record (CMR), and JUMPS refers to the same record as a Master Pay Record (MPR). Each file contains 1900 characters of MMS data and 1200 characters of JUMPS data. The basic file is maintained at the Central Design and Programming Activity (CDPA) which is co-located with the Marine Corps Finance Center (MCFC).[7] There is also a MMS file maintained on each individual Marine at one of eight Marine Corps Satellite Data Processing Installations (SDPI)

---

[7]There are actually 3 Central Design and Programming Activities. The CDPA at the Marine Corps Finance Center is the only one that deals with payroll and in this thesis references to CDPA will be to the CDPA at MCFC only.

located in the continental United States, Hawaii, and on Okinawa.

B. INPUT

1. MMS Information

First the data is manually collected at the reporting unit. The Reporting Unit (RU) is the unit that maintains the Marine's service record. The information is reported on a Unit Diary (UD), an Optically Scannable document prepared on a typewriter utilizing Optical Character Recognition (OCR) font type. Once the scannable document is typed, it is reviewed and signed by the responsible officer, and physically transmitted to the SDPI via the Administrative Control Unit (ACU). The ACU is responsible for checking the UD, correcting any obvious errors, and attempting to correct errors detected by the edit routines. Copies of the UD are forwarded to the Disbursing Office (DO).

At the SDPI, the scannable document is read into an optical scanner, converted to magnetic tape, and edited for format errors. Then the information is compared to data maintained in the Field Master Record held at the SDPI for errors in content. If the document is rejected, an attempt is made to correct the information at the ACU and the document is returned to the SDPI for re-input. If the ACU

cannot correct the information, it has to be resubmitted by the reporting unit.

If the information passes edit by the computer at the SDPI, it is transmitted (via AUTODIN) to the Central Data Processing Activity (CDPA) where the process of editing is repeated. If the information passes edit at the CDPA, then the Master Record and Field Master Records are updated. The Master Record is then accessed during the pay cycle to produce a pay amount.

If the information is rejected by the CDPA, it is returned to the SDPI and ACU, where an attempt is made to correct the information, and it is resubmitted to the CDPA. If the SDPI is unable to correct the information, then it must be resubmitted by the reporting unit.

2. JUMPS Information

JUMPS information is submitted in a similar manner, with the following additions:

1. Source documents usually have to be prepared by the same administrative office that prepares UDs and then manually transported to the disbursing office that prepares JUMPS input.
2. JUMPS Information is submitted by the Disbursing Office (DO) on one of two documents, an Allotment/Bond Authorization (ABA) for registering allotments of pay and U.S. Savings Bonds, and a

Transmittal of Data Extraction (TODE) for miscellaneous information.

3. The ABA form is normally prepared at the reporting unit and forwarded to the disbursing office for further processing and mailing to the Marine Corps Finance Center, although a DO can initiate an ABA.
4. Disbursing Office (DO), utilizing documents prepared by the RU, prepares the TODEs and forwards them to the SDPI for editing and transmittal to the CDPA. TODEs do not pass through the ACU.
5. In addition to the TODE or ABA, a Document Transmittal Letter (DTL), also a scannable document, must be prepared by the DO for each batch of TODEs or ABAs.

C. OUTPUT

1. Decentralized Payments

Under decentralizated disbursing, payment amounts are provided from MCFC to the local DO via AUTODIN in the form of a rough roll. The local DO adjusts the rough roll by adding units, adding or deleting individuals, and changing amounts according to the manual computation of pay conducted by his office. These adjustments are forwarded to the SDPI and a smooth payroll is produced to produce the paychecks. Simultaneously with the smooth roll a "comeback tape" is produced to notify the MCFC of the amounts actually

paid. The "comeback tape" is transmitted to MCFC via AUTODIN with a backup tape mailed.

2. Centralized Payments

Under centralized disbursing, payroll amounts are produced by the MCFC. This method is used by units not having a local disbursing office, and for individuals under Direct Deposit/Electronic Funds Transfer. Pay amounts are computed at the MCFC, transmitted to the local DO via AUTODIN and the SDPI, and compared with the manual pay record. Checks for over amounts and checks for transferred individuals underpaid, and those individuals for whom the checks were over, are paid by special payment. Special payments are reported back to MCFC before the next pay cycle. Utilizing the centralizing pay method MCFC claims it can produce a check within 24 hours.[8]

3. Provision for Payment

There are currently three methods of payment used by the Marine Corps. They are:

a. Direct Deposit

This is also known as electronic funds transfer and check-to-bank. The pay amount is electronically transmitted to the Marine's bank and credited to his account. All Marines on Direct Deposit are paid centrally. It

---

[8]Turner. Mr. Turner is currently the Acting Head of the Systems Management Division of the Marine Corps Finance Center, Kansas City Mo.

necessitates the Marine having a bank account at an institution participating in the program. Notification is normally, but not always, transmitted from the finance center to the Marine informing him of the amount credited to his account.

b. Check Mailed From Central Processing

This method is used for allotments, and for units not having a decentralized disbursing office as the main means of transmitting paychecks. It does not allow for a record that the individual actually received his pay. Checks are returned to the finance center rather than forwarded by the postal system.

c. Check and Cash Payments

Check and cash payments are still made by the Marine Corps at installations having a decentralized disbursing office. Cash payments are made by the local DO under centralized disbursing.

4. Leave and Earning Statements

An additional form of output from the JUMPS system is the Leave and Earnings Statement (LES). The LES is produced monthly at MCFC and deliniates the individual's pay and leave amounts including taxes withheld. The original is forwarded to the individual via his DO and RU. Both the DO and RU receive copies, which are used in the audit process.

III. THE PROBLEM

A. ERRORS IN PAY

In a June 1980 report to Congress, the General Accounting Office reported that in its audit of 55,000 financial records in the Marine Corps, 23 percent of the pay amounts calculated by the JUMPS system were in error and 19 percent of the pay accounts manually corrected still contained improper amounts.[9] An audit conducted by the Naval Audit Service in March 1978, estimated that of 196,000 pay records, 28 to 38 percent contained differences between the amount calculated by JUMPS and the amount manually computed.[10] A review by the Marine Corps Disbursing On-Site Examination Team (MCDOSET) of pay related entries found a 31 percent error rate in administrative records and a 7 percent error rate in pay records.

B. TIME DELAYS

1. The CNA Study

In October 1979, the Center for Naval Analysis

---

[9] GAO 1980

[10] NAAS 1978

conducted a study of information processing in JUMPS/MMS.[11] The study was based on data collected between October 1977 and February 1979, from twenty-two reporting units of Regiment/Group size, from six Disbursing Offices, and from two Satellite Data Processing Installations.

Approximately 59 percent of all pay-related entries are made through MMS. The study found that an average of eight days elapsed between the time an MMS event was reported on the Unit Diary (UD) and it was posted to the JUMPS/MMS Master Record.

The record for the other 41 percent was not as good. JUMPS information was divided into two categories, information reported on an Allotment/Bond Authorization form, and information reported on a Transcript of Data Extraction form. Information input on an ABA form, which comprised 43 percent of the information input via JUMPS, took an average of 16 days before it was posted to the Master Record. Information reported on a TODE took an average of 20 days before it was posted to the Master Record.

These time delays do not include the time delays in reporting information to the means of transmittal (the time between the occurrence of a pay-related event and the time the transmitting document is prepared) nor do they indicate

---

[11] CNA 1979

the percentage of information never reported via any of these documents. The time delay in reporting information to the means of transmittal (UD,TODE,ABA) was found to be an average of 16 days for a UD, 22 days for a TODE, and a questionable .8 days for an ABA. Except for some possible relation to the difficulty of preparation of the scannable document, the delay in reporting is irrespective of the means of transmittal.

2. The GAO Report

In its report of June 1980, GAO cited the "errors and inefficiencies" of the JUMPS system. Both the errors and the inefficiencies cited are the result of delays in data transmission. "Error" was the term used by GAO to describe a difference between the JUMPS-produced Leave and Earnings Statement and the manual pay record. Most of the "errors" were due to the Master Record not containing the latest information on the Marine, rather than programming errors in the system, although programming errors do exist. Both the Marine Corps and GAO have readily recognized the problem:

> The causes for pay system problems most often pointed to by the Marine Corps are the inability of local units to input accurate data on time and

a failure to adequately correct data that has been rejected.[12]

The major inefficiency cited was the labor-intensive maintenance of parallel systems of automated and manual pay computation.

3. Additional Delays

Delays are encountered in posting information to the Master Record due to the number of steps in the posting process.

C. CURRENT IMPROVEMENTS

The Marine Corps is currently introducing ADPE-FMF to replace the obsolete OPSCAN input system for Fleet Marine Force reporting units.

1. ADPE-FMF Features

ADPE-FMF is an IBM Series I mini-computer including a video display unit, a keyboard, and an impact-type printer. The mini-computer contains a resident memory and two diskette drives for immediate access storage. ADPE-FMF is designed to operate in a field environment, and will be utilized to input data for the Supported Activity Supply System (SASSY), the Marine Corps Integrated Maintenance Management System (MIMMS), the Marine Corps Combat Readiness Evaluation System (MCCRESS) and other systems, as well as

---

[12] GAO 1980

JUMPS/MMS. ADPE-FMF has been implemented in the First Marine Amphibious Force (IMAF-west coast) and is currently being implemented in II MAF (east coast). It will be introduced in Hawaii and on Okinawa by June 1982.

2. ADPE-FMF and JUMPS/MMS

a. Similar to OPSCAN

Input in to JUMPS/MMS by those units possessing ADPE-FMF will use a method similar to the one used with OPSCAN. However, instead of typing the UD, ABA, or TODE on an OPSCAN form, the document will be entered on the video display via the keyboard and recorded on one of the diskettes. The diskette will then be used to produce a printed copy of the diary which will then be approved and signed by the responsible officer. The signed copy and the diskette are then forwarded to the SDPI, with a copy also forwarded to the DO. The diskette is entered into the JUMPS/MMS system at the SDPI, a copy is produced and compared to the signed copy by the ACU, and the data is edited.

b. The Big Difference

Not considering the physical aspects of the equipment, there are two major differences between OPSCAN and ADPE-FMF:

1. ADPE-FMF contains in its memory the format for UD, ABA, and TODE entries. The operator enters a transaction code and the Marine's Social Security

Number, and the appropriate entry is presented on the video display with blanks to reflect the data needed to complete the entry.

2. ADPE-FMF also contains in its memory edit routines which will significantly reduce erroneous information submitted to the SDPI. Additionally, ADPE-FMF equipment provided to the DO can read data directly from, but cannot enter data directly into,the Master Pay Record (MPR).

D. SOLUTION

While ADPE-FMF should go a long way toward reducing time delays due to error in inputting information, those delays are only a part of the overall time delay. The solution to the problem is threefold:

1. Reduce transmission time by electronic data transmission rather than manual transportation of mailing of machine-readable documents.
2. Reduce manual handling of data by use of computer networks.
3. Reduce time in entering data by moving JUMPS input functions to the administrative office.

E. ON-LINE, REAL-TIME SYSTEMS (OLRT)

OLRT systems promise to reduce the error rate through more rapid update of the master records and through reducing data loss from human error. However, OLRT systems change the nature of internal controls in a pay system.

IV. INTERNAL CONTROL IN MANUAL PAYROLL SYSTEMS

A. BUDGETING CONTROL OF LABOR COST

Many companies use the budgeted amounts for labor costs as a check against actual labor costs to determine if payroll is being properly computed. Fraudulent or erroneous wage payments could show as excess labor costs. This method of control has never been satisfactorily employed in the Marine Corps chiefly because:

1. Marines are paid on a monthly basis rather than hourly or piecework rate, thus there is no direct connection between labor cost and output,
2. The substance of the salary (pay and allowances) rests with the President of the United States and the Congress rather than the manager who is responsible for the output, and
3. There have been few meaningful measures of output developed in the Marine Corps that can be related to pay.

B. REPORTS TO GOVERNMENT AGENCIES

Many companies have used reports of Federal and State withholding and FICA taxes as a check against standards to determine if payrolls are properly computed. However, since

there are about 192,000 Marines, the number of separate accounts and amounts reported is so large as to become incomprehensible for comparison purposes. For example, the Social Security administration is currently 18 months behind in processing earnings reported by the Department of Defense.

C. SEGREGATION OF DUTIES

1. Employment Function

Hiring, firing, and change in pay status is carried out by a separate office or at least by separate personnel from those who compute pay. In the military this is usually termed the personnel function. Hiring is generally controlled at Headquarters, Marine Corps. Changes in pay status such as promotion, reduction, or additional entitlements are usually made by local administrative office, as is firing. The authorization for these actions comes from superior levels in the command or is based on requirements stated in current regulations.

2. Timekeeping Function

In the timekeeping function, records are kept to demonstrate that services have actually been rendered. This is usually done by time cards and supervisor's reports. In the military this is done by reporting the exceptions. Unauthorized absences of over 24 hours cause stoppage of pay when they are reported. Unauthorized absences of less than

24 hours are generally dealt with at Nonjudicial Punishment sessions.

D. PAYROLL RECORDS AND PAYROLL PREPARATION

1. Preparation and Accounting are Closely Controlled

Currently, payroll for the Marine Corps is computed at either a decentralized disbursing office or the centralized finance center with the former as verification and correction agent.

a. Payment by Check or Pay Envelope

In the past, cash for the total amount of the payroll was drawn by the paying officer along with a payroll which listed the amounts owed to each individual Marine. This method is still used occasionally today. Machine-produced checks and payrolls listing them are also drawn from the disbursing office. Only disbursing officers themselves are authorized to sign checks and make payments directly from the disbursing office.

b. Statement of Earnings

The statement of earnings provides the individual being paid with a detailed description of the elements that make up his pay, and provides a means of verifying the correctness of the amount. Prior to the advent of the computer, statements of earnings for military personnel were either prepared manually, or more likely, not prepared at all. A Leave and Earnings Statement (LES) is

now produced monthly for every Marine as part of the JUMPS cycle.

c. Payroll Distribution Schedule

Using a payroll distribution schedule, labor costs are alloted to a specific work section. This method of control is not used by the Marine Corps because of the monthly rather than the hourly wage rate, and because of the lack of relationship between labor cost and output.

2. Distribution of Cash or Paychecks

a. Paymaster

Payroll checks or cash are distributed by a paymaster who is not engaged in the computation of pay. The pay is given only to the individual to whom it is owed. In the Marine Corps, the paying officer, who normally comes from the organization being paid, is authorized by his commanding officer to pick up the payroll. He draws the cash or checks from the disbursing office, and in the case of cash, counts out the amount in the presence of the individual Marine. In the case of both cash and checks, the individual receiving the pay is identified by his military identification card. Unclaimed cash is returned to the disbursing office by the paying officer. Checks for Marines temporarily absent are usually kept in the company office. Other unclaimed checks are returned to the disbursing office.

b. Payroll Account

Payroll checks are drawn on a special account. The amount of funds deposited in the payroll account serves as a limit on funds that can be drawn from the account. Only amounts equal to the authorized payroll are deposited. Marine Corps payroll checks are not drawn on a separate account.

c. Limit on the Value of a Check

This prevents erroneous or altered checks for excessive amounts from being cashed. The limit is usually printed on the face of the check. There is no limit on the face value of a government check.

d. Checks not Claimed

Checks not claimed are returned to the bank and not to the payroll office. This prevents payroll personnel from creating a check for a fictitious person and cashing it when it is returned unclaimed to the payroll office or converting a valid but unclaimed check to their own use. Unclaimed checks are returned to the disbursing office in the Marine Corps. After attempts to locate the payee, the checks are returned to the Treasury.

e. Adequate Receipt from Employee

The employee acknowledges that he has in fact received his pay. Marine Corps personnel, after identifying themselves to the paying officer, are required to sign the printed payroll. This applies both for checks and cash.

f. Standard Normal Payroll

A standard payroll is computed and adjusted for exceptions. This is then compared to the total payroll computed in the normal manner. The Marine Corps computes rough rolls which are then provided to the unit being paid, and exceptions are reconciled, however; the large number of changes in pay information result in a standard payroll being difficult to maintain.

g. Verification of Endorsements

Endorsements on canceled checks are compared to a file of employee signatures. The large volume of payroll checks processed by the Marine Corps would make this step difficult.

E. INTERNAL REVIEW

Internal review in the Marine Corps pay system is primarily the function of the Marine Corps Disbursing On-Site Examination Teams (MCDOSET). There are two MCDOSET organizations, the west coast organization located at Camp Pendleton, California, and the east coast organization located at Camp Lejune, North Carolina. These two teams are responsible for auditing a statistical sample of manual pay records and service records, and computer-generated LESs. Their audit is conducted to determine if Marines are receiving all the pay they are entitled to, and if all entitlements are supported by source documentation.

V. INTERNAL CONTROL IN AN OLRT PAY SYSTEM

The changes in internal control caused by the implementation of OLRT payroll systems are for the most part common to the adoption of OLRT systems in general. Key features of an OLRT Military Pay System which are included in OLRT system controls in general are described below.

A. ACCESS

Restricting access to files, systems and terminals is necessary to prevent unauthorized manipulation of the files and the system, which are causes of fraud and data loss.

1. File Access

In a database file system, all data files are contained in a common data base. To prevent unauthorized disclosure and/or manipulation of data, access to the files contained in the database needs to be restricted. In the case of a payroll system, access should be limited to the master personnel/pay files which the accessing terminal has responsibility to maintain. In addition, while several individuals may need access to information in the files in a read mode, only certain individuals charged with maintaining the files should have access to input information.

2. System Access

For the most efficient use of resources, terminals should not be limited to accessing the pay system only, but should be available for use on other computerized systems, such as the Marine Integrated Maintenance Management System (MIMMS) and the Marine Air Ground Financial And Reporting System (MAGFARS).

Access to the pay system needs to be limited to those individuals charged with maintaining and operating the pay system. This would prevent unauthorized disclosure or manipulation of files by individuals having access to other systems or by individuals who have obtained unauthorized use of a teminal.

3. Access to the Terminal

Access to the terminal should be restricted to prevent unauthorized disclosure and/or manipulation of systems and data. Access can be restricted by physically locking the terminal so it will not operate, placing the terminal in a secured compartment, or by using access lists which only allow certain individuals to operate the terminal by refusing to transmit data. ADPE-FMF equipment does not have a lock, but can be effectively disabled by removing the diskettes.

Another method of restricting access is time limits. One form of time limit is to allow the terminal to link to the system during certain hours. Another form is to only

allow the terminal to link to the system only a limited number of times during a specified time period. Passwords are an additional method of restricting access, but are difficult to maintain.

4. Logs

Logs should be maintained of the number of times a terminal is used, the user, the amount of time, and the system used. This log will help managers control the use of the terminal and will highlight unauthorized usage by reporting usage to responsible authorities. A log should also be maintained at each level of access recording attempts to obtain unauthorized access to terminals, systems, and files, and attempts to breach passwords.

B. DATA TRANSMISSION

Security of data transmission is also necessary to prevent unauthorized manipulation of systems and files. Forms of data transmission security are:

1. Concentrating

A concentrator is a device that locates open transmission lines for the one of several terminals that it serves that is interacting with its parent computer. The concentrator serves packs transmissions together, reducing transmission time and the number of lines needed to transmit data. The concentrator also serves as a security device, eliminating gaps in transmission that could be used by an unauthorized user to input fraudulent data.

2. Multiplexing

A multiplexer is another communications device that serves as a security tool while economizing on transmission time. A multiplexer combines multiple lines of terminals with slow transmission speed into one fast broadbeam transmission. Multiplexing increases security because the broadbeam transmission is incomprehensible to anyone not having the appropriate multiplexer to decode the transmission.

3. Rerouting

Rerouting involves transmission by various lines, not necessarily the shortest path to the destination. Rerouting enhances security by making the exact transmission line unpredictable.

4. Packet Switching

Packet switching divides the transmission into packets of data which are transmitted over available lines. Packets can be rerouted over different lines and the transmission reassembled at the destination.

5. Encoding and Decription

Data can be encoded at the source and decoded at the destination to prevent the entry of fraudulent data. Data not properly encrypted will not decode at the source and thus can be detected and will not be processed.

C. CONTROLS ON INPUT

Controls on input are necessary to prevent the input of fraudulent and erroneous data.

1. Comparison Checks

Comparison checks are a means of verifying the correctness of data that has been transmitted. Comparison is made between two copies of the same data that may have been input by different means or transmitted by different routes. Comparison detects data lost or garbled in transmission and data fraudulently input by tapping a transmission line.

2. Echo Checks

Echo checks are made by repeating the received data back to the source to be verified. They are another means of detecting lost, garbled, or fraudulently input data.

3. Absurdity Checks

Absurdity checks, also known as character mode checks, determine if the input for a given field is in the proper character mode for that field. An example of incorrect character mode would be alphabetic characters in a Social Security number.

4. Limit Checks

Limit checks are made by testing data to determine if its value is between specified upper and lower bounds. Limit checks can be applied to output as well as input.

D. DATA CONTROLS

Controls on data are necessary to ensure that only proper changes are made in the data files, and that provision is made to reconstruct files and transactions in case of computer failure or catastrophic loss.

1. Record of Transactions

Records of transactions over consecutive periods are maintained in order to verify and correct operation of the system, recover in the event of failure, and update backup systems. Records of transactions are also known as history logs.

2. Grandfather-Father-Son

The current file before updating is the "father," the current file after updating is the "son," and the previous "father" becomes the "grandfather." At least two generations should be retained so that the current file can be restored if necessary. Since in an OLRT system, the master file is being continually updated, copies of the "father" should be made for a given period, updated at the end of the period by use of the record of transactions, and compared with the "son" to check the operation of the system. Conducting this operation at a remote site provides an updated backup system in case of failure or loss of the primary system.

3. Vetting Tests

Vetting tests are tests within the program to prevent the updating of the master file based on erroneous or fraudulent data.

4. Exception Listings

An exception listing is simply a listing of data that does not meet specified criteria. In the case of an OLRT pay system, exception listings should be made of all erroneous transactions. Listings of erroneous transactions would point out system errors, transmission problems, and attempts to introduce fraudulent data into the system.

5. Concurrent Updating

Protection against concurrent updating should be incorporated in the system. Concurrent updating can result from:

1. two operators entering the same data, or
2. the same data being reentered during a restoration process.

E. INTERNAL TEST FACILITY

An internal test facility is incorporated in the programming to allow test data to be input into the system and processed along with normal data. A "mini-company" data file can be incorporated so that normal data files will not be altered by test data. The test data should exhaustively input invalid, abnormal, incomplete, and illogical

transactions. The results of the test can be analyzed to audit the performance of the system. The internal test facility can also be used by outside auditors to test the system.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

According to GAO and NAAS audits, MCDOSET inspections, and statements by the Commandant of the Marine Corps,[13] JUMPS/MMS has fallen short of the goals established by DOD, and its own goals. The system does not provide timely, accurate information to appropriation managers.

The principle of paying a Marine the correct sum he is due each payday is imbedded in the Marines' belief in taking care of its own. The JUMPS/MMS system allows this only by duplicating the automated system with a labor-intensive manual system.

The DOD JUMPS policy of

> Action and members' status changes affecting pay accounts are to be put in to the pay system at base, installation, or other levels by machine-sensible media wherever practicable, as close to the true source of input as practicable.[14] (emphasis added)

has not been followed to the practicable limit.

---

[13] CMC White Letter 1-81

[14] DODDir 7330.3

The DOD JUMPS principle of

> reducing manual and clerical efforts in operational military units and organizations[15]

has not been successfully carried out.

B. RECOMMENDATIONS

1. The Role of ADPE-FMF

a. Networking

ADPE-FMF should be linked electronically to the SDPI when practical. ADPE-FMF should be an excellent vehicle to move from the present system to an On-Line Real-Time System. Linking ADPE-FMF to SDPI would eliminate the manual transportation of the UD to the SDPI. Linking ADPE-FMF to the SDPI would provide Source Data Automation data entered into the system at the source. Linking ADPE-FMF to SDPI would allow the unit administrative personnel to verify the status of transactios in the master record.

> Source data automation techniques will be developed and applied to the maximum pratical extent.[16]

The UD and ABA would be produced as they are now on ADPE-FMF except that the UD recorded on the diskette would be released for transmittal from the ADPE-FMF by the officer-in-charge of the RU by an electronic signature or

---

[15] DODInst 7330.4

[16] Ibid

other means and, once printed for his approval, could only be altered or erased on his signal prior to being transmitted. This would provide control over information input into the system by preventing the operator from inputting fraudulent data after the approval copy is printed.

b. Documentation

All source documents would be retained at the RU. Copies would, if necessary, be forwarded to MCFC to support transactions that had already been processed by JUMPS/MMS. This would reduce manual document handling and resultant delays.

c. Computer-generated Documentation

Source documents should be generated by the JUMPS/MMS system. This would involve the computations now done manually being done by the computer, which is a basic principle of the JUMPS system.

> Centralized Pay Account Maintenance with payments generated from, and accounted for, at the central site.[17]

The basic data input as well as the calculated amounts would be printed on the document. The officer in charge of the RU would be responsible for verifying that the

---

[17] MCO P7220.37

basic data but not the monetary amount was correct and would affix his signature to that effect.

d. Single Source Input

ADPE-FMF at the RU should assume all JUMPS input. This would reduce document handling and the resultant delays, since most of the entries made by the DO are based on documents and data provided by the RU.

Centralized processing will be based on input of raw data reflecting member status changes from the level originating such changes.[18]

e. Computation Capability

ADPE-FMF should be given a restricted capability to compute pay. The capability to compute pay, together with access to the to the Central Master Record would allow verification of pay status and greatly assist the commander in dealing with pay problems.

The ability to compute pay could also be used in situations where the unit was not in contact with the CDPA such as deployments, detachments, or combat. ADPE-FMF would serve as a backup system to centralized pay. Pay amounts could be calculated by ADPE-FMF and a printout of the basic data on which the amounts were calculated. A payroll would also be printed, and cash drawn from the disbursing office by a responsible officer on presentation of a copy of the

---

[18]DODInst 7330.4

payroll and the supporting data. The payroll would be input into the JUMPS system at the lowest level having transmission capability and pay records debited, and the supporting documentation would be forwarded to MCFC for recomputation. The old manual pay record and copies of LESs would be retained in the service record as a final backup and record of pay actions.

f. Special Payments

The JUMPS initiating documents say this about special payments:

> Special payments to individual members on a local basis, such as partial or casual pay, will be made as the need arises and will generally be limited to emergency or hardship cases and to special categories of personnel, such as recruits, in-transit personnel, or personnel joining or being detached from a duty station or activity.
>
> Where local payment is made, amounts to be paid will generally be those specified by the latest leave and earnings statement prepared by and received from the central site where individual pay accounts are maintained. A detailed computation of amounts due will not be made at the local level, except that the personal financial record will be referenced, as required, to determine that amounts authorized for payment on leave and earnings statements have not been previously paid locally. Routine payments on a local (decentralized) basis of amounts not yet authorized by a leave and earnings statement will not generally be made, except under a 'pay authorization' concept whereby the central site transmits data to the payroll file.
>
> The amount to be paid for each pay period may determined by (1) centralized pay account recomputation, (2) field adjustment of preceeding end-of-month precomputation, considering subsequent pay actions which have resulted in amounts

due the member or government, or (3) by use of a 'norm' amount.[19]

Under the recommended system, special payments could be computed by one of two methods:

1. If the ADPE-FMF were in contact with the CDPA, the amount would be computed at the CDPA and a computer-generated "pay authorization" produced which would be certified by the administrative officer.

2. If the ADPE-FMF were not in contact with the CDPA, the amount would be computed as outlined by ADPE-FMF as described above.

g. Posts and Stations

Since ADPE-FMF is only being provided to the FMF, and field-capable equipment is not necessary for posts, and stations, equipment similar to ADPE-FMF must be provided to them. The equipment provided should be as close to ADPE-FMF as possible in capability and format, to provide operators with the ability to operate both types of equipment interchangeably. Those posts and stations not colocated with an SDPI must have sufficient computer capacity to handle the transmission security functions of the SDPI described below.

---

[19] Ibid

2. The Role of the SDPI

a. Continue Present Functions

The SDPI would continue its present function of editing the input documents even though they are now transmitted electronically. This function should continue until such time as the input is sufficiently accurate to render the extra edits unnecessary.

b. Transmission Security

In addition, the SDPI would provide compression, multiplexing, encoding, packet switching, and rerouting for the terminals at its location.

c. Terminal Security

The SDPI would provide control over access to the Field Master Record, and the terminals at its location, by providing:

1. Control over access lists and time limits, and
2. records of terminal usage.

Records of terminal usage should include: operator, time and date logged on, length of use, and system used should be provided to the responsible officer for each terminal. Records of unauthorized attempts to utilize terminals should be provided to responsible officers.

3. Role of the CDPA

The CDPA colocated with the MCFC would maintain its current role as the central processing arena for payroll in the Marine Corps. As such is would have several key responsibility under the recommended system.

a. Financial Responsibility

The Commanding Officer of the MCFC should have responsibility for the accuracy of computations made by the CDPA. With about 190,000 pay accounts to manage, it is obviously impossible for any one individual to vouch for the accuracy of every computation. However, he should be held responsible for the accuracy of the system, while the individual unit commanders should be held responsible for the validity of an individual Marine's entitlements.

This approach has been broached by GAO on at least two occasions.

1. In a report to Congress, the Acting Comptroller General of the United States wrote:

> The age of the computer calls for a change in the approach to determining whether payments are accurate and legal. While the verification of transactions, performed by certifying and disbursing officers for the past 200 years, is a valuable function, the methods employed need to be revised to deal with automated payment systems. In this report we recommend that the Director, Office of Management and Budget, direct Federal agencies to review annually whether each automated payment system and its related controls are operating effectively and

can be relied on to compute payments that are accurate and legal.[20]

2. In its 1980 audit of the Marine Corps JUMPS system, GAO cited the Office of Management and Budget reaction to its recommendation of changing the method of assigning responsibility:

> The Office of Management and Budget stated:
> "This report also raises serious questions as to whether or not the concept of the certifying officer is outdated as a result of technological advances. We believe that it is time to review and update this concept to be consistent with modern management techniques."
>
> The office also stated:
> "We understand that the Treasury Department has in the past suggested a study of the laws and procedures governing the personal financial responsibility of certifying officers by the Joint Financial Management Improvement Program. We believe this suggestion has merit, and we would support such a study".[21]

b. System Programming and Design

As the Central Programming and Design Activity for payroll in the Marine Corps, the CDPA at Kansas City is responsible for programming any improvements made in JUMPS. It is recommended that the MCFC be responsible for exhaustively testing modifications to the JUMPS system and for performing sufficient tests to determine if the system can be relied on the compute payments that are accurate and legal. The Systems Management Division of MCFC should be

---

[20] GAO 1977

[21] GAO 1980

provided with sufficient assets to continuously monitor, modify, and exhaustively test modifications to the JUMPS system prior to inclusion of those modifications into the active system.

c. Centralized Computation

It is recommended that all computations, except as recommended above, be done by the computer at the CDPA. Based on the raw data input by the RU, the MCFC would compute all of the pay documents that require manual calculations by the DO to include Discharge Account Summaries, Lump Sum Leave Payments, and Reenlistment Bonuses. The appropriate document would be produced by the printer at the RU, with the administrative officer certifying the raw data. Payment would either included in the next normal paycheck, by check transmitted from the MCFC within 24 hours, or by payment on demand from the nearest disbursing officer.

d. Grandfather-Father-Son

The CDPA would be responsible for forwarding "father" and "son" tapes as well as daily transaction listings to an alternate site to provide an updated backup system.

e. MCDOSET

MCDOSET would remain the key internal control in the JUMPS system. MCDOSET would be responsible for examining service records, records of transactions, and LESs

to determine if each Marine is recieving all the pay to which he is entitled and that all entitlements are supported by valid documentation. This is especially important if no documentation is maintained at the MCFC.

C. ADVANTAGES

1. Reduces Disbursing Officer workload by eliminating information input and manual calculations. Also relieves DO of responsibility for accuracy of calculations.

2. Increased input for reporting unit offset by computer-produced documentation.

3. Inquiry ability produces more rapid solution to pay problems.

4. More rapid updating of master record provides more accurate data for managers.

5. More accurate data provides more accurate pay.

6. Additionally the document production capability could be expanded to produce MMS documents such as service record book pages.

D. DISADVANTAGES

1. Increases reliance on computer systems that can fail.

2. Increases reliance on electronic communications that can fail.

3. Increases complexity of programming and reliance on programming to provide internal controls.

4. Lessens hard documentation to provide an audit trail.

5. Increases reliance on administrative office personnel to input data promptly.

E. SUMMARY

The Marine Corps can improve JUMPS/MMS response time by using ON-Line Real-Time systems to more rapidly update master records and thus produce more accurate payments to Marine Corps Personnel and more accurate personnel data functional managers.

BIBLIOGRAPHY

Bartell, W. S., Auditing with the Computer, California Press, 1965.

Bigg, W. W. and Davies, J. O., Internal Auditing, HFL Publications, Ltd., London, 1959.

Brown, H. L., EDP for Auditors, Wiley, 1968.

Cadmus, B. and Child, A. J. E., Internal Control Against Fraud and Waste. Prentice-Hall, 1953.

Center for Naval Analysis Report CRC 404 (Volumes I and II), The Effectiveness of Information Processing in JUMPS/MMS, by P. M. Buckley and Major C. A. Millard USMC, October 1979.

Commandant of the Marine Corps White Letter No. 1-81, Personnel and Military Pay Administration, 10 February 1981.

Clifton, H. D. and Lucey, T., Accounting and Computer Systems, Petrocelli, 1974.

Cushing, B. E., Accounting Information Systems and Business Organizations, Addison-Wesley, 1978.

Department of Defense Directive 7330.3, Program for the Development, Test, Evaluation, and Installation of the Joint Uniform Military Pay System, 4 November 1966.

Department of Defense Instruction 7330.4, Requirements for Development, Test, Evaluation, and Installation of the Joint Uniform Military Pay System, November 7, 1966.

Fresquez, LtCol. L. R.,"What is ADPE-FMF?," Marine Corps Gazette, April 1981.

General Accounting Office, Auditing Computers with a Test Deck, 1975.

General Accounting Office Report B-159797, Status of the Development of the Joint Uniform Military Pay System, August 17, 1970.

General Accounting Office Report FGMSD-80-49, The Marine Corps Military Pay System, Too Many Errors and Inefficiencies, June 10, 1980.

General Accounting Office Report FGMSD-76-82, New Methods Needed for Checking Payments Made by Computers, November 7, 1977.

Hussain, D. and Hussain, K. M., Information Processing Systems for Management, Irwin, 1981.

Kaminsky, M. L., "Control over Payroll, " The CPA Journal, v. 50, no. 4, April 1980.

Kaufman, F., Electronic Data Processing and Auditing, Roland Press, 1961.

Lamperti, F. A. and Thurston, H. B., Internal Auditing for Management, Prentice-Hall, 1953.

Leadership and Management Development Center, Maxwell AFB, Student Report 80A62-121, Centralized Pay, by S. E. Turner, April 1980.

Li, D. H., Accounting, Computer, Management Information Systems, McGraw-Hill, 1968.

Mair, W. C., Wood, D. R., and Davis, K. W., Computer Control and Audit, Institute of Internal Auditors, 1978.

Marine Corps Order P1080.35C, Personnel Reporting Instructions Manual (PRIM) 23 September 1980.

Marine Corps Order P7220.31D, Joint Uniform Military Pay System Field Procedures Manual, Volume I (JFPM I), 22 December 1980.

Marine Corps Order P7220.37, Joint Uniform Military Pay System Field Procedures Manual, Volume II (JFPM), 22 December 1980.

Megis, W. B., Larsen, E. J., and Meigs, R. F., Principles of Auditing, Irwin, 1977.

Naval Area Audit Service Northeastern Region Report I20026, Service Wide Audit of Marine Corps Joint Uniform Military Pay System (JUMPS), 3 September 1976.

Naval Area Audit Service Northeastern Region Report A20767, Marine Corps Finance Center, Kansas City, MO., 22 March 1978.

Porter, W. T. and Perry, W. E., EDP Controls and Auditing, Kent, 1981.

Prokop, Capt. J., Computers in the Navy, Naval Institute Press, 1976.

Sardinas, J., Burch, J. G., and Asebrook, R., EDP Auditing - A Primer, Wiley, 1981.

Scantlebury, D. L.,"The Quiet Revolution in Responsibility for Government Expenditures," Armed Forces Comptroller, v. 23, no. 4, November 1978.

Thurston, J. B., Basic Internal Auditing Principles and Techniques, International Textbook, 1949.

Tryon, M. R., Computerized Accounting Methods and Controls, Prentice- Hall, 1978.

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Technical Information Center Cameron Station Alexandria, Virginia 22314	2
2.	Defense Logistics Studies Information Exchange U. S. Army Logistics Management Center Fort Lee, Virginia 23801	1
3.	Library, Code 0142 Naval Postgraduate School Monterey, California 93940	2
4.	Department Chairman, Code 54 Department of Administrative Sciences Naval Postgraduate School Monterey, California 93940	1
5.	Marine Corps Representative, Code 0309 Naval Postgraduate School Monterey, California 93940	2
6.	Assoc. Professor Norman R. Lyons, Code 54Lb Department of Administrative Sciences Naval Postgraduate School Monterey, California 93940	1
7.	LTCOL W. R. Smith, Code 6403 Defense Resources Management Education Center Naval Postgraduate School Monterey, California 93940	1
8.	CAPT P. S. Edwards H&SCo, H&SBn Comptroller Department MCDEC Quantico, Virginia 22134	2
9.	CAPT G. O. Tootle Disbursing Office First Force Service Support Group MCB Camp Pendleton, California 92055	1
10.	Commandant of the Marine Corps (Code FDD) Headquarters, U. S. Marine Corps Washington, D. C. 20830	1

11.	Commandant of the Marine Corps (Code CCDP) Headquarters, U. S. Marine Corps Washington, D. C. 20830	1
12.	Commandant of the Marine Corps (Code MPI-60) Headquarters, U. S. Marine Corps Washington, D. C. 20830	1
13.	Commanding Officer (Code M) Marine Corps Finance Center Kansas City, Missouri 64197	1

Thesis
E253 Edwards
c.1 Improving JUMPS/MMS response time for the U. S. Marine Corps.
194435
17 FEB 83
28625

Thesis
E253 Edwards
c.1 Improving JUMPS/MMS response time for the U. S. Marine Corps.
194435

thesE253
Improving JUMPS/MMS response time for th
3 2768 001 90351 1
DUDLEY KNOX LIBRARY